

COMMENTS TO CARL WILCOX REVISIONS TO ECOSYSTEM GOALS AND OBJECTIVES PRESENTED AT THE 3/24/09 BIOLOGICAL GOALS AND OBJECTIVES WG MEETING

WORKING DRAFT BDCP HCP/NCCP Biological Goals and Objectives

Note: This handout presents SAIC revisions to the draft biological goals and objectives revisions provided by Carl Wilcox at the March 24, 2009 WG meeting. Revisions include modifications in response to comments received by SAIC from NGO and PRE representatives.

The conservation strategy is designed to achieve the biological goals and objectives established at the ecosystem level and for each natural community and the covered species that each community supports. Goals are broad, guiding principles based on conservation needs of the resources. Objectives are expressed as conservation targets or actions. Objectives are measurable and achievable within a given time frame; they clearly state a desired result and will collectively achieve the biological goals.

Biological goals for covered species are required by the Federal 5-Point Policy to be included in HCPs (65 FR 35242, June 1, 2000).

Objectives are meant to be clear, succinct, and measurable.

Metrics and targets accompany these objectives. The purpose of these metrics is to describe how progress will be measured towards or away from these goals and objectives over the course of plan implementation. These metrics, and they are also integrated into the monitoring program describes in Chapter 3.X and the Adaptive Management Program described in Chapter 3.Y. They are intended to enable the implementing entities and other interested parties to track how the implementing of the conservation measures may be effectuating improvements in the system as a whole at the larger scale of these objectives. In some cases, these metrics may be identical to those deployed to track the effectiveness of individual conservation measures; in other cases, the metrics may differ from those used at the conservation measure level.

These metrics and targets may change over time as new capabilities emerge to track performance in achieving these plan objectives and as the scientific understanding of the ecological and biological functions of the Bay Delta evolve. They are intended to serve as an essential component of the overall Adaptive Management Program for the plan, and may be changed as that program evolves.

The proposed targets are also intended to serve as technical expressions of when a particular functional objective is being achieved. They are proposed here where there exists sufficient information to support such a quantitative threshold; in other circumstances, they may await further advances in understanding how these metrics may

relate to the underlying objectives, in which case they are expressed here as having a “to be determined” status. As with the metrics themselves, they are intended to be subject to refinement or substitution as scientific understanding of the system evolves.

Ecologically Hierarchical Organization of Biological Goals and Objectives

The biological goals and objectives are organized hierarchically, on the basis of ecological scale, as follows:

1. Ecosystem Goals and Objectives
2. Natural Community Goals and Objectives
3. Species-Specific Goals and Objectives

The scope of each ecological scale is as follows:

- **Ecosystem Goals and Objectives.** Ecosystem goals and objectives are focused on improvements to the overall condition of hydrological, physical, chemical, and biological processes in the Delta.
- **Natural Community Goals and Objectives.** Natural community goals and objectives are focused on maintaining or enhancing ecological functions and values of covered natural communities. Achieving natural community goals and objectives will improve the habitat of associated covered species and other native species.
- **Species Goals and Objectives.** Species-specific goals and objectives address species-specific stressors and habitat needs that are not addressed under the higher order ecosystem and natural community goals and objectives and species-specific viability parameters as they relate to life stage occurrence of covered fish species in the Delta.

Goal ECSY 1: Provide hydrodynamic conditions within Delta waterways that ~~restore~~ mimic more ~~more~~ natural patterns of flow within ~~and outside~~ the BDCP planning area and Suisun Marsh.

Problem Statement: *Current Hydrodynamic conditions within the Delta act as ecosystem stressors by affecting species movement among habitats (straying), natural hydraulic variability, limiting habitat availability and suitability, creating conditions favoring non-native invasive species, and limiting food production. Improving these hydrodynamic ~~functions~~ conditions, so they are naturally dynamic, will relieve the adverse effects of these ~~stressors~~ functions of the Delta ecosystem ~~and for~~ covered species.*

Covered species benefiting: Delta Smelt, longfin smelt, splittail, all runs of Chinook, steelhead, green and white sturgeon.

Objective ECSY1.1: ~~Provide~~ ~~Provide~~ ~~Maintain or improve~~ ~~hy~~ ~~hydrodynamic~~ conditions that support the movement of larval and juvenile life stages of ~~covered~~ native fish species to downstream rearing habitats.

Monitoring Metrics: -Delta Outflows
Particle Tracking
Juvenile fish surveys
Percentage increases in floodplain availability
Percentage decrease in (?) rearing habitats
Water quality parameters (?)

Metric Targets: (TBD)

Objective ECSY1.2: ~~Provide~~ ~~Maintain or improve~~ hydrodynamic conditions that support the movement of adult life stages of native fish species to upstream natal spawning habitats.

Monitoring Metrics: Adult tracking surveys
Other tracking metrics as embedded in the parameters for certain operational measures related to Sacramento River and San Joaquin River outflows, cross channel operations, etc.
Water quality parameters (?)

Objective ECSY 1.~~2~~.3(5.1): ~~Maintain or increase the aerial extent of the low salinity zone to provide~~ ~~Provide~~ the ~~hydrodynamic~~, salinity, and other water quality conditions within the Delta that maintain or restore suitable habitat and ~~and~~ ~~and~~ ~~supports~~ the effective movement of and food production for ~~all life stages of native fishes.~~

Monitoring Metrics: Extent of low salinity zone (km)

Metric Targets: (TBD)

~~covered fish species between spawning, incubation, , rearing, and foraging habitat areas.~~

Objective ECSY~~1.4~~ ? (~~CHIN~~3.1): ~~Providing for~~ flows through the Delta that reflect the annual and interannual variability present in the natural hydrograph to maintain or increase life history diversity of native fishes ~~all runs of Chinook salmon~~ and to provide for a diversity of rearing conditions for native fishes ~~all runs of Chinook salmon, steelhead, and green and White Sturgeon~~ over time.

Monitoring Metrics: Hood bypass flows relative to estimated natural flow conditions in the Sacramento River based on monitoring of hydrological conditions in the watershed.

Metric Targets: (TBD)

~~**Objective ECSY ? (CHIN4.1):** Increase the proportion of all runs of adult Chinook salmon, Steelhead, green and white sturgeon that successfully migrate upstream through the Delta to upstream spawning habitats by providing conditions that minimize occurrences of false attraction into non-natal basins.~~^[r1]

~~**Objective ECSY1.2:** Provide hydrodynamic conditions that support the movement of adult life stages of covered fish species to upstream spawning habitats.~~

~~**Objective ECSY1.3:** Provide a range of salinity conditions that support habitat and food production for covered fish species.~~^[r2]

~~**Objective ECSY1.4 (DESM1.1DESM1.3):** Increase habitat availability for all delta smelt life stages in the Delta and Suisun Marsh/Bay.~~^[r3] ~~Maintain the existing distribution of delta smelt in the Delta and Suisun Bay and expand the distribution of delta smelt in the eastern and southern Delta such that the number of gravid and spent adult delta smelt sampled from Spring Kodiak Trawl Eastern and Southern Zone survey stations is similar to that sampled from [year] to [year].~~^[r4]

Objective ECSY 1.5. (LOSM1.3): Improve the natural east to west freshwater flow patterns historically present in the Delta to improve connectivity between low salinity zone habitats and upstream freshwater habitats to increase the availability of Increase haspawning habitat availability for longfin smelt spawning and rearing in the Delta and Suisun Marsh/Baynative pelagic species.

Monitoring Metrics: Modeling to eorcorrelate flows and salinity connectivity between low salinity zones and freshwater habitats;
Other metrics TBD.

Metric Targets: (TBD)

Objective ECSY 1.6? (GECF1.2): Reduce the effects for CVP and SWP operations on the ecosystem and entrainment of covered-native fish species.

[NOTE Comment: Should this objective be moved out of “ecosystems” and into another location?]

Monitoring Metrics: Entrainment and salvage surveys

Particle tracking

Others TBD

Metric Targets: (TBD)

Goal ECSY 2: Increase aquatic primary and secondary production in the Delta ~~to and Suisun Marsh to~~ increase the abundance and availability of food for ~~all life stages of covered fish species~~ native aquatic organisms.

Problem Statement: Current hydrodynamic conditions, water quality, quantity of functional inter-tidal and floodplain habitat, and the presence of non-native invasive species limit primary and secondary production in the Delta affecting its ability to support delta smelt, longfin smelt, juvenile salmonids and other native species. Increasing primary and secondary production will improve food web processes and the availability and abundance food items at multiple trophic levels.

Covered species benefiting: Delta smelt, longfin smelt, all runs of salmon, steelhead, green and white sturgeon, splittail, river lamprey, Pacific lamprey.

The following ecosystem and natural community objectives that also contribute towards achieving this goal: ECSY1.3, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

Objective ECSY2.1: Over the term of the BDCP, increase the abundance of zooplankton species that provide food and support food production for covered fish species in Delta waterways.

Monitoring Metrics: Zooplankton surveys across representative Delta and Suisun Marsh locations.

Early Target: Increase the mean abundance of zooplankton sampled at [[Delta waterway locations]] during winter, spring, summer, and fall relative to mean abundance present during these periods from 200█ to 20█.

Overall Target: Increase the mean abundance of zooplankton sampled at [[Delta waterway locations]] by at least █ percent during winter, █ percent during spring, █ percent during summer, and █ percent during

fall relative to mean abundance present during these periods from 2001 to 2005.

Goal ECSY 3: Reduce the adverse effects of non-native predators and competitors and species which modify habitat to support them in the Delta's aquatic ecosystem.

Problem Statement: ~~Changes in~~Alterations of the Delta ecosystem caused by non-natives species have reduced habitat suitability (turbidity effect, changes in habitat structure), and changed predator prey and competitive relationships between native and non-native species are a major stressor on covered fish species. Reducing the adverse effects of non-native species is expected to increase survival and abundance of covered fish species.

Covered species benefiting: Delta smelt, longfin smelt, all runs of salmon, steelhead~~,,~~.

Objective ECSY3.1: Manage the distribution and abundance of established non-native invasive species in the Delta to reduce non-native species predation on and competition with ~~covered native fish~~es species, and to rehabilitate aquatic ecosystem processes.

Monitoring Metrics: Distribution and abundance of targeted non-native species

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., removal targets for Egeria)]

~~**Objective ECSY3.2:** Manage the distribution and abundance of established non-native invasive species in the Delta to~~ rehabilitate aquatic ecosystem processes.

~~[Note: metrics, targets, and monitoring for this objective would be subsumed in conservation measures (e.g., removal targets for Egeria)]~~

[r5]

Objective ECSY3.32: Minimize the likelihood for future invasions and establishment of non-native species into the Delta's aquatic ecosystem.

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., number of boats inspected for presence of non-native organisms)]

Goal ECSY 4: Reduce the adverse effects of contaminants on the Delta's aquatic ecosystem.

Problem Statement: A variety of contaminants entering Delta waterways are hypothesized to have direct lethal and sublethal effects on fish species and food web processes that adversely affect food abundance and availability. Reducing the loads of contaminants entering the Delta that are known or suspected to have these adverse effects on the aquatic ~~ecosystem~~ ecosystem is expected to increase survival and abundance of covered fish species.

Covered species benefiting: Delta smelt, longfin smelt, all runs of salmon, steelhead, green and white sturgeon, splittail, river lamprey, Pacific lamprey.

Objective ECSY4.1: Determine through ongoing or new research the extent of effect and source of known and suspected contaminants in the aquatic ecosystem and identify measures to reduce or eliminate their effects. [r6]

Objective ECSY4.2: Contribute to specific actions which have a demonstrated positive effect in improving the aquatic ecosystem by reducing the load of contaminants of concern entering the Delta to levels in conformance with existing and future water quality standards.

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., reduce pyrethroids entering the Delta from in Delta sources by "X")]

Goal ECSY5: Support a properly functioning Delta ecosystem by improving the amount, spatial distribution, function, and connectivity of natural communities across the Delta to support ecosystem productivity and the effective movement and genetic exchange of covered species within and among natural communities both inside and outside of the BDCP planning area.

Problem Statement: Poor availability to, function of, connectivity among and accessibility to natural communities within and outside the BDCP planning area is hypothesized to inhibit proper ecosystem function and support for native species. Expanding the ~~availability~~ availability by, improving the function, ~~and~~ connectivity between and accessibility to natural communities will enhance ecosystem processes and productivity to support improved abundance, distribution, diversity, and growth of covered species populations.

Covered species benefiting: Delta smelt, longfin smelt, all runs of salmon, steelhead, green and white sturgeon, splittail, river lamprey, Pacific lamprey, terrestrial species to be determined (clapper rail, black rail, delta plants associated with intertidal and flood plain, Swainsons hawk, VP species, cranes).

The following ecosystem and natural community objectives also contribute towards achieving this goal: ECSY1.1-1.3 and NACO1.1-1.5.

Objective ECSY5.21: Protect and expand the availability of spatially well-distributed aquatic, and terrestrial natural communities to support increased distribution of covered species, aquatic productivity, and improved connectivity among natural communities within and adjacent to the BDCP planning area.

Monitoring Metrics: Extent, distribution, and connectivity of among natural communities.

Metric Targets: (TBD)

Goal NACO1: Protect, enhance, and restore ~~tidal-perennial aquatic, freshwater and brackish tidal marsh, and riparian, and terrestrial natural~~ communities to provide habitat and ecosystem functions to increase the natural production (reproduction, growth, and survival), abundance, and distribution of ~~covered native Delta~~ species.

Problem Statement: ~~[To come.]Habitat critical essential- for the spawning, incubation, rearing, and foraging of native fishes -has been degraded around the Bay Delta, and this has restricted species distribution, life history diversity, and growth of covered fish species. Increasing habitats has been hypothesized is expected to increase distribution, life history diversity and growth of covered fish species. [[Need to revise or add statement for covered terrestrial species].~~

Objective NACO1.1: ~~Increase the frequency that floodplain habitat within the Yolo Bypass is inundated for at least ___ consecutive days to approximately ___ percent of years. Increase hydrologic connectivity of Delta waterways with existing and historical floodplains to support habitat and food production for associated native species.~~

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., frequency, duration, and extent of Yolo Bypass inundation)]

Objective NACO1.2: ~~Provide for the inundation of at least ___ acres of historical floodplain surfaces that have been disconnected from river channels to provide habitat and ecosystem functions that support of covered species.~~ [r7]

Objective NACO1.32: ~~Restore, manage, and protect at least ___ acres of freshwater tidal marsh in the Delta that provides habitat and ecosystem functions in support of covered species.~~ Increase the extent and spatial distribution of tidal marsh within the Planning Area and Suisun Marsh to support habitat and food production for associated native species.

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., extent and location of restored habitat)]

Objective NACO1.4: Restore, manage, and protect — acres of brackish tidal marsh in Suisun Marsh/Bay to provide habitat and ecosystem functions in support of covered species. [r8]

Objective NACO1.53: Increase the extent and spatial distribution of ~~Restore at least — acres of~~ riparian forest and scrub within the ~~Delta Planning Area~~ to support habitat and food production for associated native species and increase connectivity among native habitats within and adjacent to the Planning Area. ~~provide habitat and ecological functions in support of covered species.~~

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., extent and location of restored habitat)]

Goal NACO2: ~~Conserve sufficient agricultural, grassland, natural seasonal wetland, non-tidal perennial aquatic, and non-tidal perennial permanent emergent marsh communities in the Planning Area to contribute to the conservation of associated covered species.~~

~~Problem Statement: [To come.]~~

Objective NACO2.1.4: Increase the extent of preserved pasture lands and lands that are farmed for rice, alfalfa, and row crops in the Planning Area that are managed to support habitat for native species. ~~protected agricultural lands within the Planning Area that are managed to support habitat for associated covered species.~~

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., extent and location of preserved ag lands)]

Objective NACO2.21.5: Increase the extent of ~~protected-preserved~~ grasslands within the Planning Area that support and are preserved as habitat for ~~associated covered species~~ associated native species.

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., extent and location of protected habitat)]

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Objective NACO~~2.31.6~~: Increase the extent of ~~protected-preserved~~ natural seasonal wetlands, including vernal pools and their micro-watersheds, within the Planning Area that are preserved as habitat for ~~associated covered species~~ associated native species.

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., extent and location of protected habitat)]

Objective NACO~~2.41.7~~: Increase the extent of protected non-tidal perennial aquatic and associated non-tidal perennial permanent emergent marsh communities within the Planning Area that are preserved as habitat for associated ~~covered species~~ native species.

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., extent and location of protected habitat)]

Covered Species Goals and Objectives

General Covered Fish Species

Goal GECF1: Increase the abundance of covered fish species by reducing sources of unnatural mortality.

Problem Statement: *Non-natural sources of mortality are hypothesized to inhibit the abundance and distribution of covered species and the diversity and growth of their populations. Reducing the proportion of covered fish species populations that are subject to loss from these mortality sources will support increasing the abundance, distribution, diversity, and growth of covered fish species populations.*

Objective GECF1.1: ~~Reduce entrainment of covered fish species at non-project diversions if adaptive management monitoring determines these diversions are adversely affecting populations.~~
~~Evaluate the entrainment of covered fish species at non-project diversions and reduce if shown to adversely affect them.~~

Monitoring metrics: TBD

Metric targets: TBD

~~**Objective GECF1.2:** Reduce entrainment of covered fish species at the Banks Pumping Plant and the Jones Pumping Plant.~~

~~Objective GECF1.3: Reduce entrainment of covered fish species at the SWP and CVP north Delta diversion intakes in the BDCP long-term implementation period.~~

Objective GECF1.42: Contribute towards reducing the risk for dissolved oxygen sags in Delta and Suisun Marsh waterways that could result in mortality of covered fish species.

Monitoring metrics: dissolved oxygen concentration

Metric targets: TBD

Objective GECF1.53: Minimize the adverse effects of harvest on green and white sturgeon, splittail, and all runs of Chinook salmon, ~~green and white sturgeon, and splittail.~~

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., increased levels of law enforcement)]

Goal GECF2: Reduce impacts of hatcheries on the genetic integrity of artificially propagated and natural populations of covered fish species.

Problem Statement: Hatcheries lower the genetic fitness and support negative ecological interactions between hatchery and wild individuals, which- inhibit the abundance, life history diversity, and growth of self-sustaining populations of covered species. Reducing the negative- impacts of hatcheries on the genetic integrity and ecological interactions between propagated and wild covered fish species populations will support improved abundance, distribution, diversity, and growth of covered fish species populations.

~~Hatcheries are hypothesized to lower the genetic fitness and support negative ecological interactions between hatchery and wild individuals, which- inhibit the abundance, life history diversity, and growth of self-sustaining populations of covered species. Reducing the impacts of hatcheries on the genetic integrity and ecological interactions between propagated and wild covered fish species populations will support improved abundance, distribution, diversity, and growth of covered fish species populations.~~

GECF2.1: Minimize the adverse effects of salmonid hatcheries on the genetic integrity of wild Chinook salmon and steelhead populations.

[Note: metrics, targets, and monitoring for this objective would be the the same as those provided for in the relevant conservation measures (e.g., increased levels of law enforcement)]

GECF2.2: Maintain or establish genetic refugia for delta smelt and longfin smelt to reduce the risk for the extinction of delta smelt and the extirpation of longfin smelt.

[Note: metrics, targets, and monitoring for this objective would be the same as those provided for in the relevant conservation measures (e.g., increased levels of law enforcement)]

Delta Smelt

Goal DESM1: ~~Contribute to~~Create -conditions that support a viable population of delta smelt in the Delta and Suisun Bay.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives that also contribute towards achieving this goal: ECSY1.1-1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.4, and GECF2.2.

~~**Objective DESM1.1:** Maintain the existing distribution of delta smelt in the Delta and Suisun Bay and expand the distribution of delta smelt in the eastern and southern Delta such that the number of gravid and spent adult delta smelt sampled from Spring Kodiak Trawl Eastern and Southern Zone survey stations is similar to that sampled from [year] to [year].¹~~

Alternate 1-Objective DESM1.2: Increase the abundance of delta smelt within the Delta and Suisun Bay such that, in any five year period, the combined Fall Midwinter Trawl (FMWT) catch for September and October will exceed 29 in two years and the two-year running average will never fall below 84.⁺

Metrics: Fall Mid-water Trawl surveys

Target: Combined FMWT surveys in Sept/October for any five year period will exceed 29 in two years and the two year running average will not drop below 84. ~~*[Note: metrics and targets subsumed in objective]*~~

Alternate 2-Objective DESM1.2: Increase the abundance of delta smelt within the Delta and Suisun Bay such that, in any ten year period, the FMWT index will not be less than 100 and will exceed 500 in at least three years and exceed 1,000 in at least one of the ten years.¹

Metrics: FMWT Surveys

¹ This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

Target: In any 10 year period, the FMWT index will not be less than 100 for any one year and will exceed 500 in at least 3 years, and exceed 1,000 in at least 1 year.

~~Objective DESM1.3: Increase habitat availability for all delta smelt life stages in the Delta and Suisun Marsh/Bay.~~

Objective DESM1.43: Increase delta smelt stock recruitment in years of comparable hydrology relative to hydrological conditions observed from [year] to [year].

[Note: metrics and targets subsumed in objective]

Longfin Smelt

Goal LOSM1: Create conditions that support a viable population of longfin smelt in the Delta and Suisun Bay.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives that also contribute towards achieving this goal: ECSY1.1-1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECSF1.1-1.4, and GECSF2.2.

Objective LOSM1.1: Contribute to increasing the abundance of longfin smelt within the Delta and Suisun Bay such that, in wet water years the FMWT index will be at least 5,000 and the FMWT index does not decline below 100 in any year.²

Metric: FMWT Surveys

Target: FMWT index equals or exceeds 5,000 in wet years and does not drop below 100 in any year.

[Note: metrics and targets subsumed in objective]

Objective LOSM1.2: Increase the abundance of longfin smelt within the Delta and Suisun Bay relative to mean abundance indices for [year] to [year] based on results of FMWT surveys.

Metrics:

[Note: metrics and targets subsumed in objective]

² This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

~~**Objective LOSM1.3:** Increase habitat availability for all longfin smelt life stages in the Delta and Suisun Marsh/Bay.~~

Objective LOSM1.43: Increase longfin smelt stock recruitment in years of comparable hydrology relative to hydrological conditions observed from [year] to [year], such that in wet years the FMWT index will be at least 5000 and the FMWT will not fall below 100 in any year.

Metric: FMWT Surveys

Target: FMWT index equals or exceeds 5,000 in wet years and does not drop below 100 in any year.

~~[Note: metrics and targets subsumed in objective]~~

Chinook Salmon

Goal CHIN1: Increase the survival of juvenile Chinook salmon passing through the Delta.

***Problem Statement:** Mortality rates of juvenile Chinook salmon attributable to multiple factors within the Delta are hypothesized to be excessive and a factor inhibiting the growth of Chinook salmon populations. Reducing mortality rates of juvenile Chinook salmon in the Delta will support improved abundance, distribution, diversity, and growth of Chinook salmon populations.*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.5, and GECF2.1.

Objective CHIN1.1: Increase the survival of juvenile Sacramento Basin spring-run Chinook salmon passing through the Delta to Chipps Island ~~in the BDCP near-term implementation period~~ by █ percent, fall/late fall-run Chinook salmon by █ percent, and winter-run Chinook salmon by █ percent from mean survival rates observed from [year] to [year].

~~[Note: metrics and targets subsumed in objective]~~

~~**Objective CHIN1.2:** Increase the survival of juvenile Sacramento Basin spring-run Chinook salmon passing through the Delta to Chipps Island in the BDCP long-term implementation period by █ percent, fall/late fall-run Chinook salmon by █ percent, and winter-run Chinook salmon by █ percent from mean survival rates observed from [year] to [year].~~

Objective CHIN1.32: Increase the survival of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island ~~in the BDCP near-term implementation period~~ by █ percent from mean survival rates observed from [year] to [year].

[Note: metrics and targets subsumed in objective]

~~**Objective CHIN1.4:** Increase the survival of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island in the BDCP long-term implementation period by █ percent from mean survival rates observed from [year] to [year].~~

Objective CHIN1.53: When a spawning population of spring-run Chinook salmon established in the San Joaquin River, provide for survival of San Joaquin Basin spring-run Chinook salmon passing through the Delta to Chips Island in the BDCP long-term implementation period of at least █ percent.

[Note: metrics and targets subsumed in objective]

Goal CHIN2: Increase the growth of juvenile Chinook salmon that pass through and rear in the Delta to increase the likelihood for survival of juvenile Chinook salmon in San Francisco Bay and ocean habitats.

Problem Statement: [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY2.1, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

Objective CHIN2.1: Increase the mean weight and length of juvenile Sacramento Basin spring-run Chinook salmon, fall/late fall-run Chinook salmon, and winter-run Chinook salmon passing through the Delta to Chipps Island.

Monitoring metrics: weight and length of juvenile salmonids

Metric targets: TBD

Objective CHIN2.2: Increase the mean weight and length of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island.

Monitoring metrics: weight and length of juvenile salmonids

Metric targets: TBD

Goal CHIN3: Maintain or increase life history diversity of all runs of Chinook salmon.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.

Goal CHIN3: ~~Maintain or increase life history diversity of all runs of Chinook salmon.~~

Problem Statement: *[To come.]*

~~The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.~~

~~**Objective CHIN3.1:** Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for all runs of Chinook salmon over time.~~

Goal CHIN4: Increase the proportion of all runs of adult Chinook salmon that successfully migrate upstream through the Delta to upstream spawning habitats.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives ~~also contribute towards achieving~~achieve this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, GECF1.5, and GECF2.1.

~~**Objective CHIN4.1:** Provide flow conditions that minimize occurrences of false attraction of all runs of adult Chinook salmon into non-natal basins.~~

~~**Objective CHIN4.2:** Increase the passage of all runs of Sacramento Basin adult Chinook salmon past the Fremont Weir into the Sacramento River by percent from the passage efficiency provided by the existing Fremont Weir fish ladder.~~

Central Valley Steelhead

Goal STEE1: Increase the survival of juvenile steelhead passing through the Delta.

Problem Statement: *Mortality rates of juvenile Central Valley steelhead attributable to multiple factors within the Delta are hypothesized to be excessive and a factor inhibiting the growth of the steelhead population. Reducing mortality rates of juvenile steelhead in the Delta will support improved abundance, distribution, diversity, and growth of the Central Valley steelhead population.*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.5, and GECF2.1.

Objective STEE1.1: Increase the survival of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island ~~in the BDCP near-term implementation period~~ by percent from mean survival rates observed from [year] to [year].

~~**Objective STEE1.2:** Increase the survival of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island in the BDCP long-term implementation period by percent from mean survival rates observed from [year] to [year].~~

Objective STEE1.3: Increase the survival of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island ~~in the BDCP near-term implementation period~~ by percent from mean survival rates observed from [year] to [year].

~~**Objective STEE1.4:** Increase the survival of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island in the BDCP long-term implementation period by percent from mean survival rates observed from [year] to [year].~~

Goal STEE2: Increase the growth of juvenile steelhead that pass through and rear in the Delta to increase the likelihood for survival of juvenile steelhead in San Francisco Bay and ocean habitats.

Problem Statement: [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY2.1, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

Objective STEE2.1: Increase the mean weight and length of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island.

Monitoring metrics: weight and length of juvenile salmonids

Metric targets: TBD

Objective STEE2.2: Increase the mean weight and length of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island.

Monitoring metrics: weight and length of juvenile salmonids

Metric targets: TBD

Goal STEE3: Maintain or increase life history diversity of Central Valley steelhead.

Problem Statement: [To come.]

The following ecosystem, ~~natural community, and general covered fish species~~ objectives ~~also contribute towards~~ achieving this goal: ECSY1.1-1.3 and ECSY5.1.

~~**Objective STEE3.1:** Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for Central Valley steelhead over time.~~

Goal STEE4: Increase the proportion of adult Central Valley steelhead that successfully migrate upstream through the Delta to upstream spawning habitats.

Problem Statement: [To come.]

The following ecosystem, natural community, and general covered fish species objectives ~~also contribute towards~~ achieving/achieve this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, GECF1.5, and GECF2.1.

~~**Objective STEE4.1:** Provide flow conditions that minimize occurrences of false attraction of all runs of steelhead into non natal basins.~~

~~**Objective STEE4.2:** Increase the passage of steelhead past the Fremont Weir into the Sacramento River by percent from the passage efficiency provided by the existing Fremont Weir fish ladder.~~

~~**Objective STEE4.3:** Increase the passage of San Joaquin Basin adult steelhead past the Stockton Deep Water Ship Channel by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods steelhead are present.~~

Sacramento Splittail

Goal SASP1: Maintain and conserve a viable population of Sacramento splittail in the Delta.

Problem Statement: [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.4, ECSY4.1-4.4, ECSY5.1-5.2, , NACO1.1-1.5, GECF1.1-1.5.

~~**Objective SASP 1.1:** Implement a new comprehensive monitoring program for Sacramento splittail in their current range with multiple mark recapture techniques as designed by the Department of Fish and Game.³ [r14]~~

Objective SASP 1.21: Contribute towards increasing the abundance of Sacramento splittail within the Delta and Suisun Bay in the near-term implementation period such that the following conditions are met.

1. The FMWT numbers will exceed 19 or greater for seven of 15 years, the Suisun Marsh catch per trawl will exceed 3.8 for seven out of 15 years, and young-of-year abundance will exceed 3.1 per trawl for at least three out of 15 years (splittail young-of-year abundance can be applied to meet the total abundance (i.e., 3.1 young per trawl can be applied to meet the 3.8 target).
2. Bay Study otter trawl numbers will be 18 or greater and catch of young-of-year will exceed 14 for 3 out of 15 years.⁴

Objective SASP1.32: Contribute towards increasing the abundance of Sacramento splittail within the Delta and Suisun Bay in the long-term implementation period to achieve target abundance values ~~based on the new monitoring program established under Objective SASP1.1.~~⁵

Monitoring metrics: TBD

Metric targets: TBD

Objective SASP1.43: Maintain the distribution of Sacramento splittail within the Delta and Suisun Bay to achieve targets distribution values ~~based on the new monitoring program established under Objective SASP1.1.~~⁵

Monitoring metrics: TBD

Metric targets: TBD

~~**Objective SASP1.5:** Provide increased spatial availability of Sacramento splittail spawning habitats.~~

³ This objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

⁴ This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

⁵ This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

Objective SASP1.6⁵: Maintain multiple spawning cohorts of Sacramento splittail as part of the breeding population ~~as indicated by first dorsal ray aging data collected under the new monitoring program established under Objective SASP1.1.~~⁵

Green Sturgeon

Goal GRST1: Increase the proportion of green sturgeon that successfully migrate upstream through the Delta to upstream spawning habitats.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives ~~also contribute towards~~ achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, and GECF1.5.

~~**Objective GRST1.1:** Provide flow conditions that minimize occurrences of false attraction of adult green sturgeon into non-natal basins.~~

~~**Objective GRST1.2:** Increase the passage of adult green sturgeon past the Fremont Weir into the Sacramento River by ___ percent from the passage efficiency provided by the existing Fremont Weir fish ladder.~~

~~**Objective GRST1.3:** Provide for the potential reestablishment of green sturgeon in the San Joaquin River by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods adult green sturgeon are migrating to spawning habitats.~~

Goal GRST2: Increase the spatial distribution of juvenile green sturgeon within the Delta. ~~Increase juvenile green sturgeon habitat availability.~~

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives achieve ~~also contribute towards achieving~~ this goal: ECSY1.3, ECSY5.1, and NACO1.1-1.4.

Goal GRST3: Maintain or increase life history diversity of green sturgeon.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives achieve this goal: ECSY1.1-1.3 and ECSY5.1.

~~Objective GRST1.1: Increase the spatial distribution of juvenile green sturgeon within the Delta.~~

~~Goal GRST3: Maintain or increase life history diversity of green sturgeon.~~

~~Problem Statement: [To come.]~~

~~The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.~~

~~Objective GRST3.1: Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for green sturgeon over time.~~

White Sturgeon

Goal WHST1: Increase the proportion of white sturgeon that successfully migrate upstream through the Delta to upstream spawning habitats.

Problem Statement: [To come.]

The following ecosystem, natural community, and general covered fish species objectives achieve also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECE1.4, and GECE1.5.

~~Objective WHST1.1: Provide flow conditions that minimize occurrences of false attraction of white sturgeon into non-natal basins.~~

~~Objective WHST1.2: Increase the passage of white sturgeon past the Fremont Weir into the Sacramento River by percent from the passage efficiency provided by the existing Fremont Weir fish ladder.~~

~~Objective WTST1.3: Increase the passage of white sturgeon past the Stockton Deep Water Ship Channel by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods white sturgeon are present.~~

Goal WHST2: Increase the spatial distribution of white sturgeon within the Delta.
Increase juvenile white sturgeon habitat availability.

Problem Statement: [To come.]

The following ecosystem, natural community, and general covered fish species objectives ~~achieve also contribute towards achieving~~ this goal: ECSY1.3, ECSY5.1, and NACO1.1-1.4.

Objective WHST 2.1: ~~Increase the spatial distribution of white sturgeon within the Delta.~~

Goal WHST3: Maintain or increase life history diversity of white sturgeon.

Problem Statement: [To come.]

The following ecosystem, natural community, and general covered fish species objectives ~~achieve also contribute towards achieving~~ this goal: ECSY1.1-1.3 and ECSY5.1.

Objective WHST3.1: ~~Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for white sturgeon.~~

River Lamprey

Goal RILA1: Maintain the ecological functions of the Delta that support a viable population of river lamprey in the Central Valley.

Problem Statement: [To come.]

The following ecosystem, natural community, and general covered fish species objectives achieve this goal: To come.

Objective RILA1.1: ~~Provide flow conditions that support upstream migration of adult river lamprey through the Delta to upstream spawning habitats.~~

Objective RILA1.2: ~~Maintain sufficient low salinity zone holding habitat to support the abundance of river lamprey needed to successfully metamorphosis and outmigrate from the Delta to maintain a viable Central Valley population.~~

Terrestrial Covered Species

[To come.]